FIGS. **9a** and **9b** illustrate another embodiment of the optical hinge **401**, which can be constructed in the form of a ball-joint. As shown, the optical hinge **401** comprises a first optical component **410** and a second optical component **450**, which can be rotated relative to the first optical component **410** over a two-dimensional angular range. The first optical component **410** includes a sphere **412**, which is made of an optical material and is joined to a supporting body **414**. The sphere **412** has a cavity or recess **416** in order to allow the first optical component to be optically coupled to a first opto-tranceiver **418**. The second optical component **450** includes a hemisphere **452** joined by a supporting body **454**. The hemisphere **452** also has a cavity or recess **456**, which is optically coupled to a second opto-tranceiver **458**. The surface **422** of the sphere **412** and the inner surface **463** of the hemisphere **452** define a gap **490**, allowing the second optical component **450** to rotate relative to the first optical component **410**. The recess **416** has a surface, which can be flat or curved, to allow light rays **502**, **504**, . . . , **508** to be transmitted into the sphere **412**. As shown in FIG. **9a**, while light rays **504**, **506** can directly reach the second opto-tranceiver **458** through the gap **490**, light rays **502**,**508** are reflected by the surface **422** before reaching the second opto-tranceiver **458**. When the second optical component **450** is rotated by an angle β as shown in FIG. **9b**, while light rays **507**, **509** can reach the second opto-tranceiver **458** through the gap **490**, light rays **503**, **505** are reflected by the spherical surface **422** before reaching the second opto-tranceiver **458**. In order to increase the optical coupling efficiency between the first optical component **410** and the second optical component **450**, it is possible to silver part of the sphere surface **422**. The silvered section of the surface **422** is denoted by reference numeral **424**.

The optical hinge and the optical hinge apparatus, as described above, can be used for one-way data transmission or two-way data transmission. If two-way data transmission is used, it is easy to monitor the status of the hinge. For example, a feedback signal can be conveyed from the second circuit board to the first circuit board to indicate the light level received by the opto-electronic device of the second circuit board. If the hinge is broken or damaged, a “low light” message can be conveyed to first circuit board to cause the power to cut down. Thus, eye safety protection is achieved even when light may escape from the optical hinge because of the damage. Furthermore, because the optical paths between the photo-transmitter and the photo-receiver can be made very short, the light level that is used to transmit optical data can be kept very low so as to improve the eye safety aspect of the electronic device. Low light level can also have the advantage of saving battery power.

The optical hinge and the optical hinge apparatus do not have any practical limits to the data transfer capacity. Some properties are stemmed from the photo-transmitter and the photo-receiver components. Furthermore, the optical hinge can be used to conduct light for illumination purposes.

It should be noted that the description, taken in conjunction with FIGS. **1** to **8b**, is only used to demonstrate the principle of the optical hinge and the optical hinge apparatus. With this teaching, it is possible to make various changes without departing from the disclosed principle. For example, it is preferred that the light beam **102** undergoes total internal reflection when it encounters a dense-rare boundary at the surface **20** and at the surface **40**. It is possible that the surface **20** and the surface **40** are silvered, if so desired. The first optical component **10** and the second optical component **30** can be made from glass or a clear plastic, or any suitable material which is transparent to the wavelength of interest. The optical waveguides **10**" and **30**" can be L-shaped, as shown in FIG. **5a**, but they can be straight or curved differently. They can be made of optical fibers or simply a short piece of plastic or glass. Moreover, the surface **20** (FIG. **2**) can be spherical or aspherical.

Although the invention has been described with respect to preferred embodiments thereof, it will be understood by those skilled in the art that the foregoing and various other changes, omissions and deviations in the form and detail thereof may be made without departing from the spirit and scope of this invention.

What is claimed is:

1. An optical hinge for providing an optical link between a first opto-electronic device capable of providing a light beam and a second opto-electronic device, said optical hinge comprising:

a first optical component having a first mechanical engagement member, and

a second optical component having a second mechanical engagement member for mechanically engaging with the first mechanical engagement member for rotation along a rotation axis, wherein

the first mechanical engagement member has a first dense-rare boundary surface, and

the first optical component has a first cavity for optically coupling the first optical component to the first opto-electronic device, so as to allow the light beam to be transmitted through the first cavity toward the first dense-rare boundary surface of the first mechanical engagement member, and wherein

the second optical component has a second cavity for optically coupling the second optical component to the second opto-electronic device, and

the second mechanical engagement member has a second dense-rare boundary surface forming a gap with the first dense-rare boundary surface where the first and second mechanical engagement members are mechanically engaged for rotation to allow the light beam to be transmitted through the first dense-rare boundary surface, the gap, and then the second dense-rare boundary surface of the second mechanical engagement member toward the second cavity in order to reach the second opto-electronic device at different rotation angles.

2. The optical hinge of claim **1**, wherein the light beam is transmitted through the first cavity along a first optical path, and the first optical component further comprises an optical path altering means for directing the light beam transmitted along the first optical path towards the gap along a second optical path different from the first optical path.

3. The optical hinge of claim **2**, wherein the second optical component further comprises a further optical path altering means for directing the light beam transmitted along the second optical path towards the second cavity along a third optical path different from the second optical path.

4. The optical hinge of claim **2**, wherein the optical path altering means comprises a reflecting surface.

5. The optical hinge of claim **4**, wherein the reflecting surface is a total internal reflection surface.

6. The optical hinge of claim **3**, wherein the further optical path altering means comprises a reflecting surface.

7. The optical hinge of claim **6**, wherein the further reflecting surface is a total internal reflection surface.

8. The optical hinge of claim **2**, wherein the first cavity has a curved surface for focusing the light beam prior to the light beam being transmitted along the first optical path.

9. The optical hinge of claim **8**, wherein the curved surface is spherical.